

Audit the AI:

Human-in-the-Loop Formative Assessment for Any Subject

GRADE LEVEL
Grades 5-12

TIME REQUIRED
15- 45 Minutes

SUBJECT AREAS
English, Math, Science, Social Studies, Creative Arts, Computer Science

Lesson Overview

After using an AI tool to create a visual representation of content, students will critique the AI model.

The goal of this lesson is for students to use an AI generated image to efficiently assess student understanding of a complex topic or content. Students could be asked to generate the images themselves, critique them and then use AI to improve the visualization or the images can be generated ahead of time focusing more on the analysis of the visualization.

Learning Objectives

By the end of this lesson, students will be able to:

- Identify important components needed to represent or illustrate a concept
- Describe important relationships between components of a model
- Evaluate the strengths and weaknesses of an AI generated model of a concept
- Describe improvements that need to be made in an AI generated model for it to correctly represent or illustrate a concept

Standards Alignment

CSTA AI Priorities

Ethical AI System Design:

Ethical Evaluation of AI Systems

- Evaluate the effectiveness of an AI system in achieving its intended purpose
- Analyze how the limitations of an AI system (such as inaccuracies in complex diagrams) can impact a user's understanding of a topic
- Identify potential biases or "hallucinations" in AI-generated content that could lead to misinformation or misconceptions

Humans and AI

The Human Role in Creating AI

- Explain the importance of "Human in the Loop" oversight when using AI for educational or professional tasks to ensure accuracy and quality
- Apply human domain expertise (background knowledge) to critique and improve AI-generated outputs
- Iteratively refine AI outputs by providing specific, corrective feedback through prompt engineering to reach a desired goal

Societal Impacts of AI

Individual Impacts

- Critically assess the reliability of AI as a primary source of information versus traditional verified sources

CSTA Standards

Standard	Area	Description
2-DA-08	Data and Analysis	Collect data using computational tools and transform the data to make it more useful and reliable.
3A-DA-11	Data and Analysis	Create interactive data visualizations using software tools to help others better understand real-world phenomena
3A-AP-21	Algorithms and Programming	Evaluate and refine computational artifacts to make them more user-friendly or efficient.

Educational Technology

Standard	Description
3.b	Students evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.
6.c	Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or data.

Science

Standard	Description
Science Practice 2	Developing and Using Models Evaluate limitations of a model for a proposed object or tool Evaluate merits and limitations of two different models of the same proposed tool, process, or system.
Science Practice 7	Engaging in Argument from Evidence Evaluate the claims, methods, and designs of a model to determine its merits.
Crosscutting Concepts	Systems and System Models Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

Mathematics

Standard	Description
2.MP.4	Model with Mathematics Students apply mathematics to analyze practical situations, mapping relationships using diagrams, graphs, and formulas.
3.MP.5	Use Appropriate Tools Strategically Students consider available tools, such as software or calculators, when solving problems and recognize both their potential insights and limitations.
4.MP.6	Attend to Precision Students communicate precisely, using clear definitions and definitions to express mathematical ideas.

Social Studies

Standard	Description
SSS1.9-12.1 and 9-12.2	Critique the precision of claims, reasoning, and supporting details.
SSS2.9-12.2	Evaluate the validity and credibility of sources
SSS4.9-12.2	Construct arguments, including evidence and recognizing weaknesses.

English Language Arts

Standard	Description
CCRA.R.7/ 9-10.7 & 11-12.7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
SL9-10.2/1 1-12.2	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
W.9-10.8/11 -12.8	Gather relevant information from multiple authoritative print and digital sources; assess the strengths and limitations of each source in terms of the task, purpose, and audience.

Materials & Resources

Teacher Background

- AI for Education, AI Image Generation for Educators
<https://www.aiforeducation.io/blog/ai-image-generation-for-educators>
- Project zero Thinking Routine “Slow Complexity Capture: Find, Capture, Explain, Wonder” <https://pz.harvard.edu/resources/slow-complexity-capture>

Student Resources

- AI generated image or access to an AI image generator (I used SciSpace)
- Copies of Slow Complexity Capture graphic organizer
- Copies of selected prompts

1 ENGAGE	<p>Purpose: <i>Hook students into deeply interacting with an AI generated visualization by illustrating that AI commonly makes mistakes in its output</i></p> <p>Teacher Actions</p> <ul style="list-style-type: none"> – Present the “Water Cycle” AI generated image. – Have students turn and talk to process their opinion of the provided image – Facilitate student identification of “inaccuracies” or “weaknesses” of this AI generated image <p>Student Actions</p> <ul style="list-style-type: none"> – Review the image – Discuss inaccuracies and weaknesses of the AI generated image <p>Key Focus</p> <ul style="list-style-type: none"> – AI makes mistakes
2 EXPLORE	<p>Purpose: <i>Explore an AI generated image related to subject specific content</i></p> <p>Teacher Actions</p> <ul style="list-style-type: none"> – Create an imperfect content specific visualization using the AI tool of choice. This allows students the opportunity to critique AI outputs even when AI tools are blocked for students. – Provide students with copies of the “Slow Complexity Thinking Routine” graphic organizer – Allow students 5 to 10 minutes to explore the visualization using their graphic organizer to record ideas – Facilitate a turn and talk during which students share what the notice and wonder <p>Student Actions</p> <ul style="list-style-type: none"> – (If students have access to AI, they can create a content specific visualization instead) – Use the organizer to explore the visualization – Share ideas with neighbors during a Turn and Talk <p>Key Focus</p> <ul style="list-style-type: none"> – Identify important and relevant details represented by the visualization
3 EXPLAIN	<p>Purpose: <i>Students more deeply analyse and evaluate the visualization</i></p> <p>Teacher Actions</p> <ul style="list-style-type: none"> – Select developmentally appropriate prompts from the prompt list – Allow students 10 minutes to evaluate the visualization through the lens of the prompts <p>Student Actions</p> <ul style="list-style-type: none"> – Evaluate the visualization by responding to the selected prompts <p>Key Focus</p> <ul style="list-style-type: none"> – Applying background knowledge to evaluate the visualization

4
ELABORATE

Purpose: *Facilitate meaning making and student justification of their claims*

Teacher Actions

- Facilitate a class discussion or report out during which students share their observations and evaluations of the visualization

Student Actions

- Participate in discussion and meaning making
- Justify claims with reasoning

Key Focus

- Defend claims with reasoning

5
EVALUATE

Purpose: *Assess understanding of content through revision of the visualization to better represent the desired content .*

Teacher Actions

- Select age appropriate revision prompts
- Allow students additional time for revision of the visualization

Student Actions

- Thoughtfully revise the visualization. This could look like:
 - Answer the prompts
 - Annotate the visualization
 - Use AI to improve the existing visualization
 - Hand draw or sketch a new visualization

Key Focus

- Use background knowledge to revise the visualization

Extensions:

- Have students create a “better” representation of the concept using an AI tool or by hand drawing/sketching
- In the event that this lesson is being used in a course where the emphasis is on evaluating the use of AI, students can complete the provided reflection

Differentiation & Supports (UDL-Based)

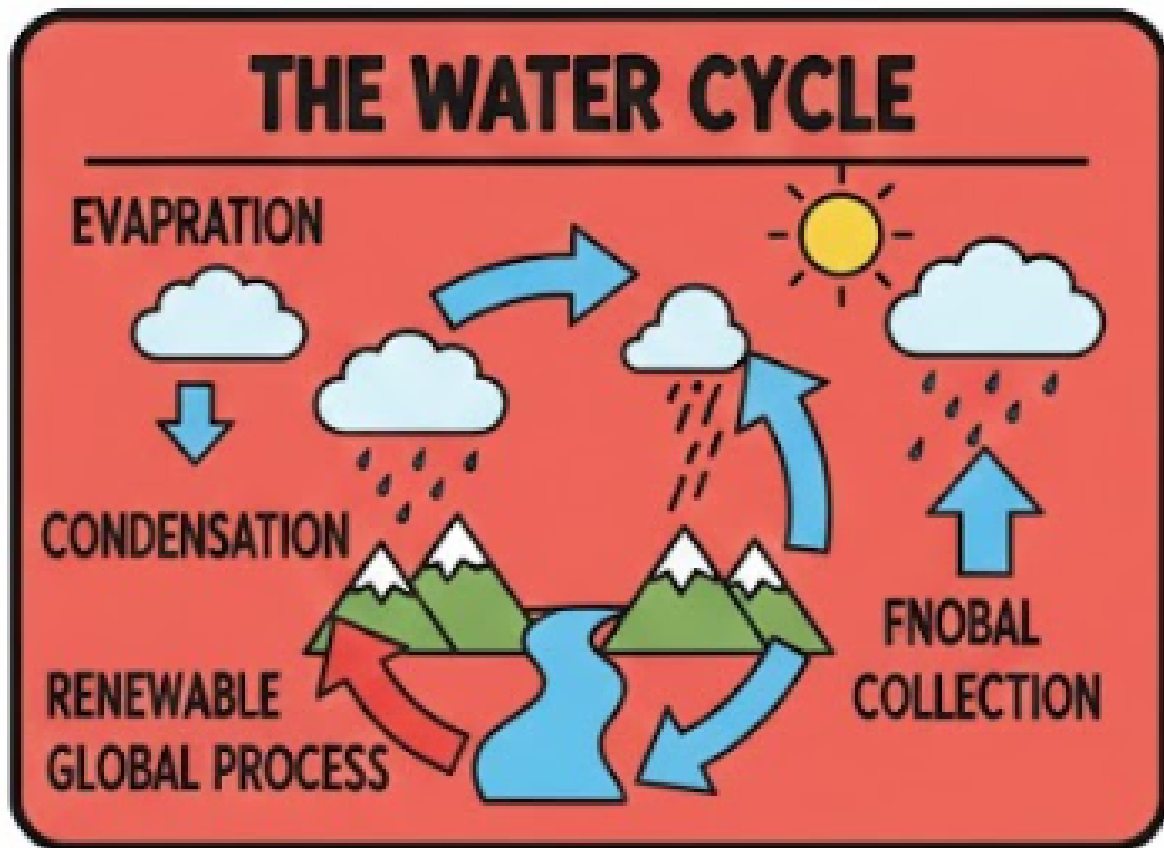
Representation	Action and Expression	Engagement
<ul style="list-style-type: none">• Content delivery- create a video summary or a podcast-style recoding• Visual Aids- Use visual cues (icons) to help students identify key words in prompts• Vocabulary Support- Provide a visual glossary of complex vocabulary	<ul style="list-style-type: none">• Assessment- allow students to choose between several different modalities for their revised visualization• Support- Encourage the use of speech to text or grammar software to focus on reasoning rather than mechanics of writing	<ul style="list-style-type: none">• Collaboration- Assign clear roles to students based on strengths• Check ins- Break the lesson into smaller manageable tasks with meaningful feedback following each• Relevance- Encourage students to select a revision process that fits their strengths and weaknesses

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Supplementary Materials

“The Water Cycle” created using Gemini and NanoBanana. Prompt: Create a one page visualization of everything that an AP student needs to know about water using details from the College Board AP Biology CED. Files uploaded: AP Biology CED

<https://apcentral.collegeboard.org/media/pdf/ap-biology-course-and-exam-description.pdf>



KEY: Some details that stand out:

Evaporation is misspelled

Evaporation should be next to the sun since that is the energy that causes the process

What is the water evaporating from?

Precipitation is missing or maybe labeled as “FNOBAL COLLECTION” which doesn’t even make sense

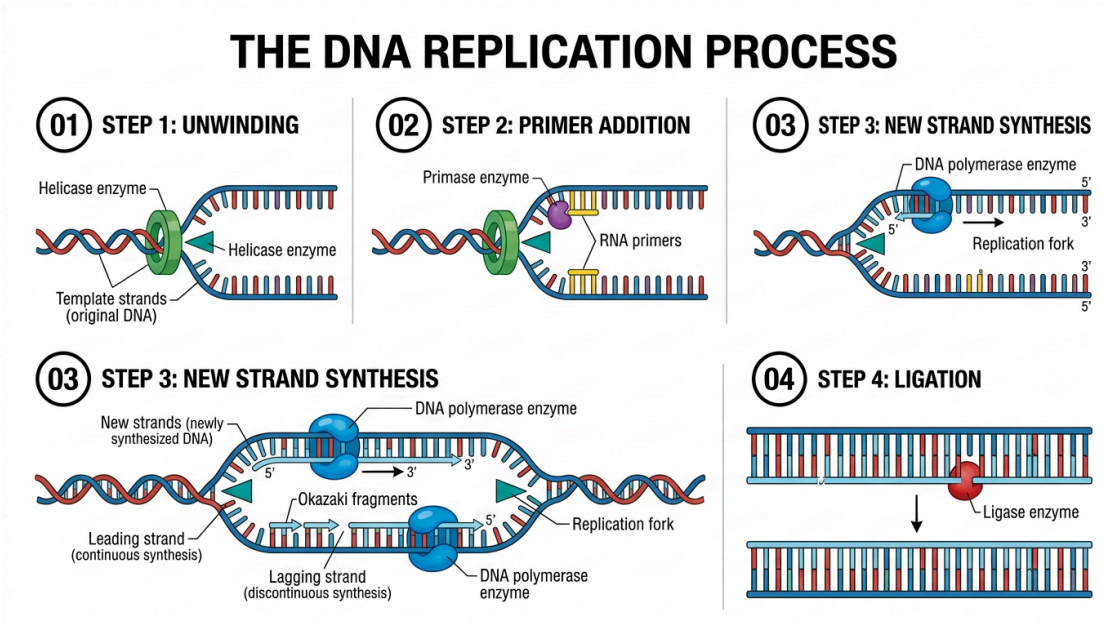
Not sure why one of the arrows is red?

Drawn as a cycle that is “renewable” but its not clear how water is recycled when only evaporation and condensation are labeled.

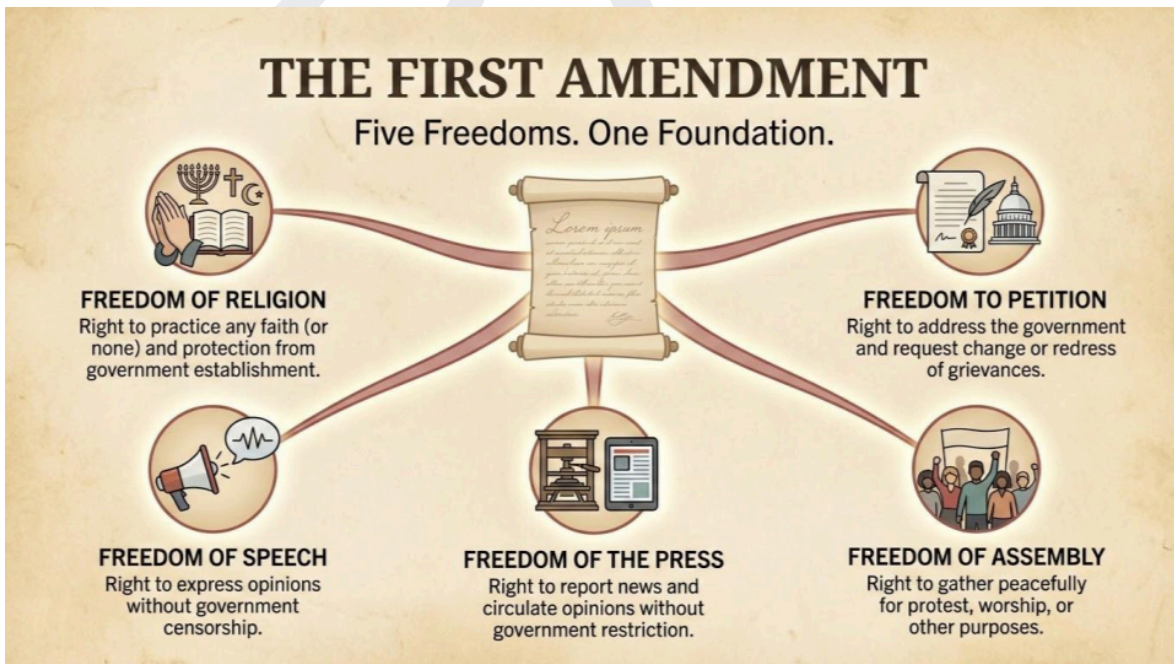
Completely ignores runoff, ground water, or other examples of storage.

Visualization Examples

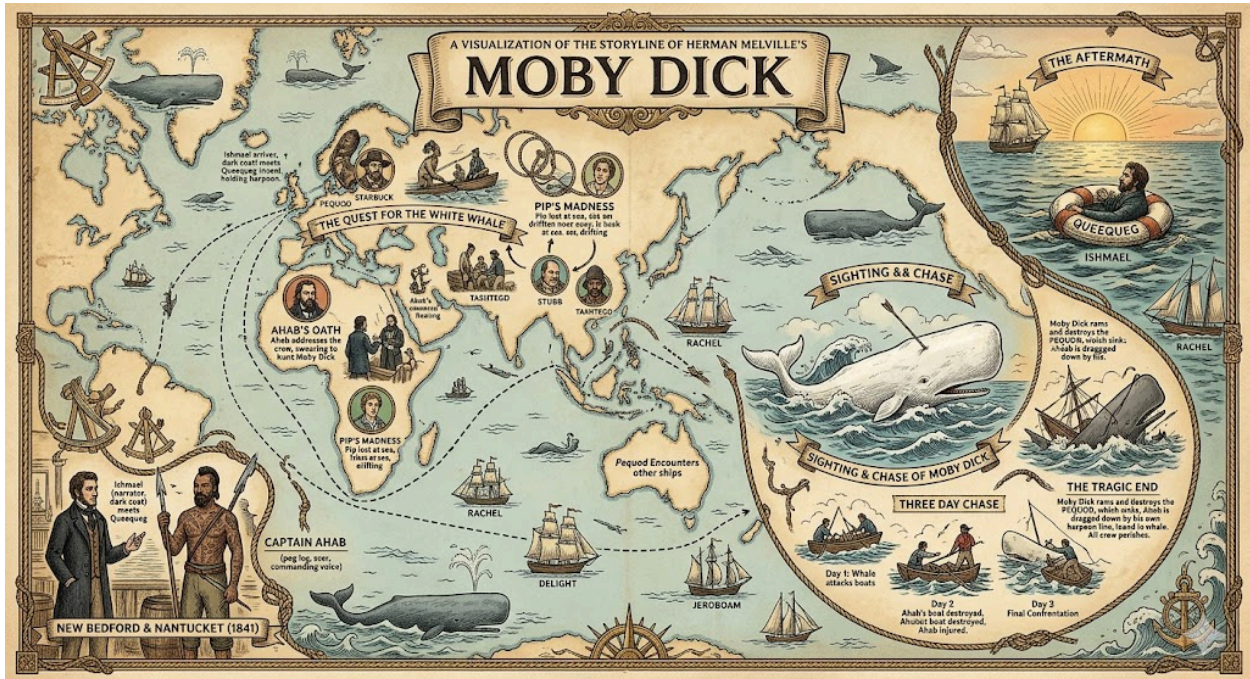
Science Example constructed with SciSpace ai prompt “create a visualization of DNA replication”



Social Studies example created with Google Slides Help me visualize built in ai. Prompt “create a visualization of the first amendment.”



Literature Example created using Gemini and NanoBanana. Prompt "create a visualization of the storyline of Moby Dick"



Slow Complexity Thinking Routine Graphic Organizer

SLOW COMPLEXITY CAPTURE GRAPHIC ORGANIZER
A Project Zero Thinking Routine

1. SLOW DOWN
PICK A SECTION OF THE VISUALIZATION TO EXPLORE

2. CAPTURE THE PARTS
KEY PARTS & ACTORS

3. MAP THE INTERACTIONS
CONNECTIONS & RELATIONSHIPS

4. WONDERINGS

Source: Project Zero, Harvard Graduate School of Education.

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Analysis Prompts

Evaluate:

1. Does this model accurately represent all of the important components needed to illustrate this concept? If not, what components are missing?
2. Are all components in the model accurately represented? If not, what corrections should be made?
3. Are all important processes or relationships correctly illustrated? If not, what processes or relationships are missing?
4. Are the processes or relationships in the model correctly illustrated? If not, what corrections should be made?
5. Did the AI include any “nonsense” elements or labels that do not contribute to understanding this topic?
6. What are the strengths of this illustration or model?

Revise:

7. What are the weaknesses of this model?
8. If a student who knew nothing about this topic studied this diagram, what misconceptions might they walk away with?
9. In what ways could this model be improved?
10. What subtle details of this concept are too complex for the AI to visualize? How would you explain those details to someone looking only at this diagram?
11. Based on the errors you found, what specific instructions would you add to a new prompt to ensure the AI fixes these mistakes in the next version?

Reflection Questions

1. Human Expertise vs. AI Errors



Describe one specific moment in today's lesson where your own "human" knowledge found a mistake the AI made. Why do you think the AI missed this detail?

2. If you saw a strange label or "nonsense" element (like "FNOPAL COLLECTION" in the water cycle example), how did you decide it it it was incorrect? What other source did you use to check the truth?



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2. Evaluating AI as an Information Source

2. Trust vs. Verification: On a scale of 1 to 5, how much did you trust the AI diagram before you revised it? How much do you trust it now?

Before Revision: 1 (Low) - - - - 5 (High)

After Revision: 1 (Low) - - - - 5 (High)



Trust vs. Verification: On a scale of 1 to 5, how much did you trust the AI diagram before you fixed it? How much do you trust it now?

Before Revision: 1 (Low) - - - - (High)

After Revision: 1 (Low) - - - - (High)



Reliability: In the future, would you use an AI-generated image as the main study tool for a test? Why or why not?

Yes

No

3. Conceptual Understanding & Visualization



The Nuance Gap: What part of this subject concept is the hardest to "visualize" with a picture? How would you explain that part in words to someone else?

6. Concept Mastery: Did finding and fixing the AI's mistakes help you understand the topic better than just looking at a "perfect" textbook diagram?

- Yes, seeing the mistakes forced me to think more deeply.
- No, it was confusing to see the wrong information.
- Unsure.



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